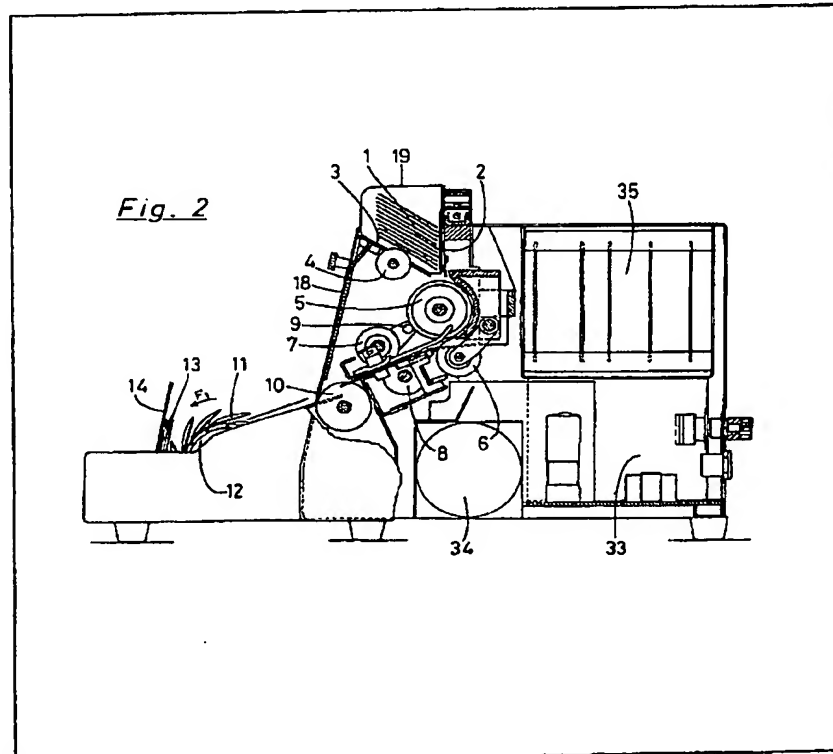


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(54) Counting bank notes

(57) A table-top machine for counting used notes includes a feed hopper 1 with means for lateral positioning of wads of notes, before these are passed one by one to counting means and to a length checker constituted by two rows of photoelectric elements arranged transverse to the path of the notes. The lateral positioning means is made up of two guides on click-stopped carriages, linked by a cable passing over pulleys. The notes are checked individually by an infra-red detector, a metal strand detector and a double feed detector triggered by the lower transparency of two superimposed notes. After counting, the wad is reconstituted.



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SPECIFICATION

Table top machine for counting wads of used notes

- 5 The present invention relates to a table-top machine for counting wads of used notes, comprising driving means with rollers for moving the notes one by one, counting means and means for receiving and reconstituting the wad.
- 10 Various types of machine are known for counting notes in the wads received by central banks. Although they facilitate very rapid and mechanical counting of the notes, these machines such as the machine made by GLORY Ltd., of Japan type G.N.B/1/S, are nevertheless incapable of detecting the presence of a note which does not belong in the wad, whether the latter is a note having a different value or a forged note. The most frequent error is the presence of a note of another value and this is owing to the very similar dimensions of certain notes. It would therefore be advantageous if a machine for counting wads is at least capable of detecting a note having a different value.

- The present invention intends to ensure at least a
- 25 check of this type.
- To this end, the machine according to the invention is characterised by the fact that it also comprises at least means for checking the length of the notes comprising two rows of photo-electric elements
- 30 arranged transversely with respect to the trajectory of the notes and means for the lateral positioning of the notes at the inlet of the machine constituted by two guides respectively integral with two carriages moving on a rail and coupled to each other by a
- 35 flexible connection passing over two pulleys so that they move in opposite directions and in synchronism, a positioning device comprising a ball provided for positioning each of the carriages in different positions corresponding to the different values of
- 40 the notes.

- The means for the rapid positioning of the wad at the inlet of the machine make it possible to position the notes correctly with respect to the rows of photo-electric elements, which makes it possible to
- 45 work with a minimum number of photo-electric elements, checking the length being carried out by counting the photo-electric elements covered by the notes in each row.

- The same rows of photo-electric elements may
- 50 also be used for checking if the notes have dog-ears, i.e. corners which have been folded over of unacceptable dimensions. In this case the note is withdrawn from circulation.

- The machine may also advantageously be equipped with other checking means such as means for checking for the passage of two notes at the same time as well as means for checking the authenticity of the notes.

- The accompanying drawings illustrate, by way of
- 60 example, a preferred embodiment of the invention.
- Figure 1 is a front elevational view of the machine.
- Figure 2 is a side elevational view thereof, partly in section.

- Figure 3 shows a detail of figure 2, in section on
- 65 line III-III of Figure 1.

Figure 4 is a view of the upper part of the outlet of the machine in direction IV of Figure 3.

Figure 5 is a view of the lower part of the outlet of the machine in direction V of Figure 3.

- 70 Figure 6 is an elevational view partially in section of the device for centring the notes.

Figure 7 is a plan view of this same centring device.

- Reference will firstly be made to figures 1 and 2. In
- 75 its upper part the machine comprises a container 1 intended to receive the wads of notes and constituted essentially by a main vertical plate 2 and an oblique plate 3 together constituting a type of hopper. The plate 3 comprises openings for the
- 80 passage of three driving rollers 4 intended to introduce the notes one by one into the counting device. The latter is constituted in known manner by three drive rollers 5 co-operating with counter-pressure rollers 6 which ensure the travel of the
- 85 notes in front of the counting cell. The notes are then entrained between two sets of rollers 7 and 8, the upper pressure rollers 7 being able to be raised about a pivot 9. The notes then leave on a smooth roller 10 and are propelled between the inclined
- 90 teeth 11 of two wheels 12 set in rotation in the direction of arrow F1, which reconstitute the wad 13 against two approximately vertical abutments 14, between which it is possible to recover the reconstituted wad. The ejection of the notes in the direction
- 95 of the wheels 12 is ensured by two rollers 15 and 16. The plate 3 of the hopper comprises a recess 17 facilitating the positioning of the wad or its removal. The entire checking mechanism is protected behind a removable plate 18.

- 100 The wad introduced into the hopper 1 is retained laterally and centred by means of two guides 19 and 20 constituted by plates which are able to move perpendicular to the plates 2 and 3, which may be positioned opposite two graduations 21 and 22 indicating the value of the notes to be counted.

- Provided on the right-hand side of the machine is a panel 23 comprising a digital display 24 associated with the counter, an arrangement of three keys 25 for preselecting the number of notes to be counted, a
- 110 control switch 26, a switch 27 making it possible to select the value of the notes to be counted and checked, two buttons 28 and 29 making it possible to correct by one unit, more or less, the number of notes counted, in the case where a note is withdrawn
- 115 from or added to the bundle and a start/stop switch 30.

- Provided on the left-hand side of the machine is a panel comprising eight indicator lights referred to by the references A to H and indicating respectively
- 120 when they are illuminated, the preselected value reached, multiple start, empty inlet, jammed note, incorrect dimensions, dog-ears, detection of forgery by the authenticity check number one and detection of forgery by the authenticity check number two.

- 125 This panel also comprises a main switch 32.

- The remainder of the machine includes a power supply circuit 33, a drive motor 34 and an arrangement of cards 35 comprising the electronic circuits for the counting and checking means. These circuits
- 130 are either known or taken from larger installations

constructed by the applicant and described in prior patents and will not be described again here. Only the original arrangement of the detectors will be described with reference to figures 3 to 5. Counting of the notes takes place approximately in the region of the point 49, in known manner by means of a photo-electric cell. The detection members for carrying out the various checks are mounted on two plates 37 and 38, parallel in the operating position and located at a slight distance from each other, which is just sufficient for the passage of the notes, the plate 38 being integral with the shaft of the rollers 7 and being able to be raised with the latter by pivoting about pivots 9 in order to release a note which may be jammed between the plates 37 and 38. The plates 37 and 38 comprise cut-outs such as 39 for the passage of the drive rollers. The lower plate 37 comprises two rows of slots 40 and 41 arranged on the same line transversely with respect to the direction of travel of the notes behind which are mounted photo-electric elements, for example photodiodes. The upper plate 38 also comprises two rows of slots 43 and 44 arranged opposite the slots 40 and 41 and behind each of which is located a light source, for example luminescent diodes. The electric leads have not been shown so as not to overcrowd the drawings. The photo-electric elements 42 make it possible to check the length of the note, i.e. its value. In fact it is sufficient to count the photo-electric elements which are covered or not covered by the note as it passes. The same photo-electric elements make it possible to detect the presence of dog-ears, which are detected by a reduction in the length of the notes in the vicinity of their front and rear edges, seen in the direction of movement. Pulses in synchronism with the movement of the note make it possible to determine the width of the note, i.e. the successive passage of these front and rear edges. Checking for dog-ears may be carried out by means of circuits such as those described in published French Patent Application 2443107.

Counting the notes and checking their value is a minimum check of the authenticity of these notes before they are put back into circulation or destroyed. To this end, the machine comprises means for checking using infrared ray and means for checking the presence of a metal strand.

The means for checking using absorption of infra-red radiation 42 are mounted on the upper plate 38. These means comprise essentially two identical devices each comprising a light source constituted by a luminescent diode 45 respectively 45', in front of which is placed an infra-red filter and a photodiode 46 respectively 46', placed quite close to the diode 45 respectively 45'. The diodes 45 and 45' are supplied by a high frequency source of modulated current for example of 100KHz. The light reflected is received by the photodiodes 46 and 46'. The signal received is demodulated and processed as described in Swiss Patent Application No. 4 130/78-4.

Checking the presence of a metal strand is carried out by means of a detection head 47 forming part of a resonant circuit 48 supplied by a high frequency source whereof the frequency is close to the reso-

nance frequency of the circuit. The variation of current in the resonant circuit at the time of the passage of the strand has the effect of modulating the high frequency and it is sufficient to demodulate this signal in order to detect the presence during a reading window of the strand, as described in published French Patent Application No. 2 422 210.

The lower plate 37 also comprises a photo-electric cell 49 for checking the transfer of the note from the machine. This cell 49 uses the infra-red light source 45 as its light source.

A special photo-electric cell 50 is provided further to the rear on the plate 37 for checking if a note has remained jammed in the machine. This cell co-operates with a light source 51 mounted on the plate 38.

A photo-electric cell 52 is finally provided which cooperates with a light source 53 for detecting double notes, i.e. superimposed notes which have been counted as a single note by the counting cell. This detector for detecting double notes operates by transparency. The signal received is rendered digital by a trigger, the threshold of which is regulated according to the absorption through a note. In order to reduce the detection errors owing to the absorption differences depending on the quality of the notes, the pulses are counted in synchronism with the speed of travel of the notes throughout the duration of passage of the latter in front of the detector. Since the number of pulses detected is twenty for example for a normal width of note, if two notes are superimposed, the light received will be less and the number of pulses will be very much less than twenty, for example five, which makes it possible to detect double notes.

The movable guides 19 and 20 make it possible to carry out rapid centring of the wads of different values in the container 1. These guides are respectively integral with two carriages 54 and 55 mounted to slide on a cylindrical bar 56 and in a profiled support 57 extending transversely above the container 1. An endless cable 60 passes through the carriages 54 and 55 through two parallel bores 58 and 59 and passes around two grooved pulleys 61 and 62. The carriage 54 is connected to one of the strands of the cable 60 at a point 63, by means of a screw, whereas the other carriage 55 is connected to the other strand at a point 64. The cable 60 is tensioned by means of four studs 65. Fixed to the carriages are small plates 66 and 67 each provided with a row of holes 68, respectively 69 forming housings for a ball 70 respectively 71 mounted on a spring 72 in screws supported by a cross-member 73, for positioning the carriages in one of the positions corresponding to the graduations 21 and 22. For positioning the two guides 19 and 20 in the position corresponding to the value of the notes of the wad to be counted, it is sufficient to push one of the guides close to the corresponding graduation, the other guide entrained by the cable 60 being positioned automatically opposite the graduation, the final positioning being ensured by the balls 70 and 71.

When the wad has been introduced and centred in the container 1, the user places the selector button

27 at the suitable value and by means of the keys 25 introduces the number of notes to be located in the wad. The user then starts up the machine by pressing the button 30. If the preselected number is reached, the indicator light A lights up. If the checking means detect a note of incorrect dimensions or comprising dog-ears of inadmissible dimensions or a forgery, the indicator light in question lights up and the machine stops. The note identified is removed. The operator presses the button 29 in order to correct the number counted by one unit if less or completes it by a note which is in a good condition. The number of notes, respectively the value of the notes counted is recorded and memorised. It may be processed by a suitable data processing installation.

CLAIMS

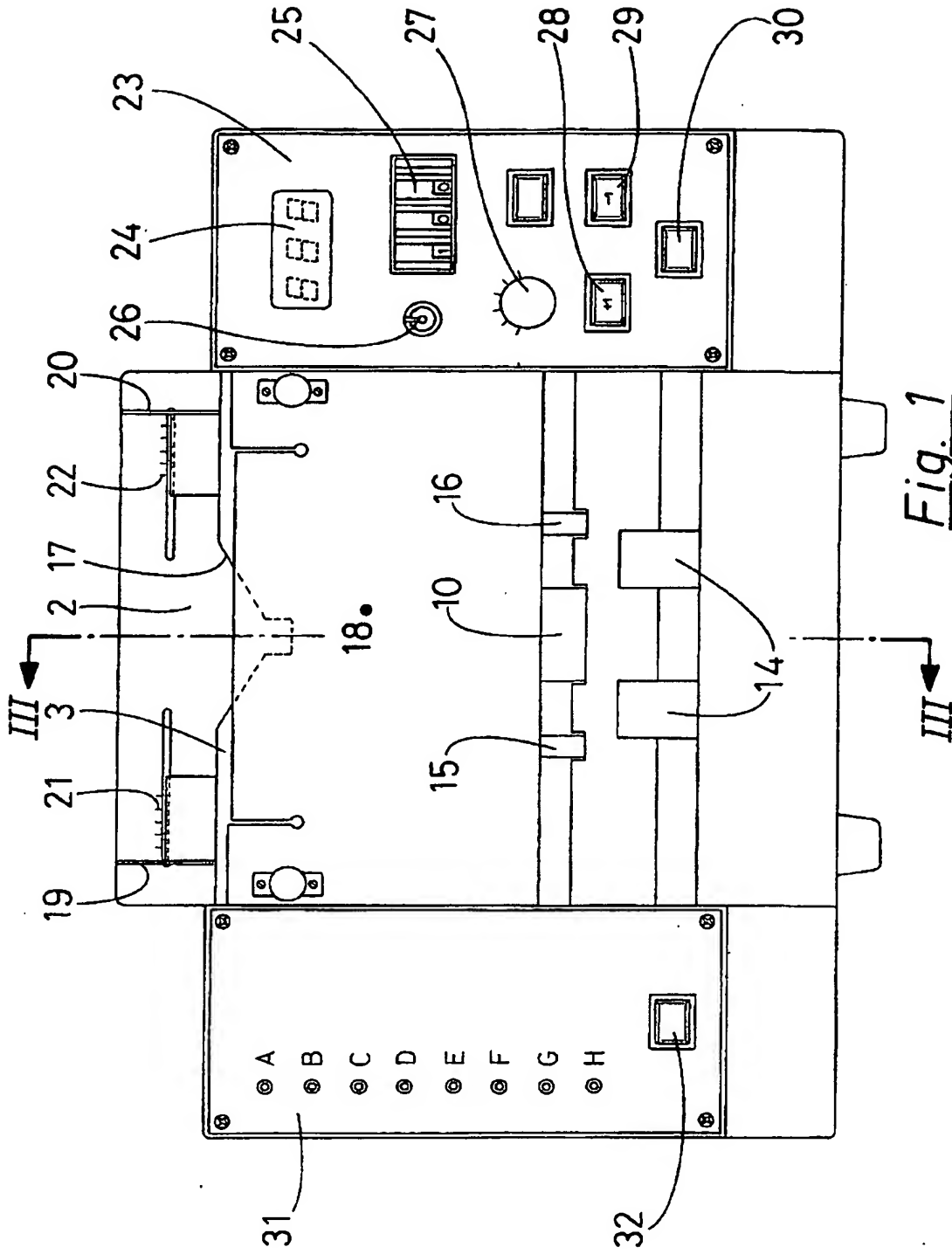
- 20 1. A table-top machine for counting wads of used notes, comprising driven roller means for moving the notes one by one, counting means and means for receiving and reconstituting the wad, the machine being characterised by means for checking the length of the notes and including two rows of photo-electric elements arranged transversely with respect to the path of the notes through the machine, means for the lateral positioning of the notes at the inlet of the machine and constituted by two guides respectively integral with two carriages movable along a rail and coupled by a flexible connection passing over pulleys so that they move in opposite directions in synchronism, and a positioning device for positioning each of the carriages in different positions corresponding to the different values of the notes.
2. A machine according to claim 1, in which the positioning device comprises a carriage-positioning ball.
- 40 3. A machine according to claim 1 or 2, comprising means for checking the corners of the notes in order to detect the presence of dog-ears.
4. A machine according to claim 3, in which the means for checking the corners is constituted by the same photo-electric elements as used for checking the length of the notes.
5. A machine according to any preceding claim comprising means for checking the authenticity of the notes, said means being an infra-red detector and a detector for the metal strand contained in the notes.
6. A machine according to any preceding claim, comprising means for checking the passage of two superimposed notes, said means including a light source, a receiver detecting the light pulses after they have passed through the thickness of the notes.
7. A machine according to any one of the preceding claims comprising means for checking the transfer of the notes and including a photo-electric detector element.
8. A machine according to claim 6, in which the photo-electric detector element of the means for checking the transfer is placed opposite the infra-red source of the means for checking authenticity.
- 65 9. A table-top machine for counting wads of used

notes substantially as hereinbefore described with reference to the accompanying drawings.

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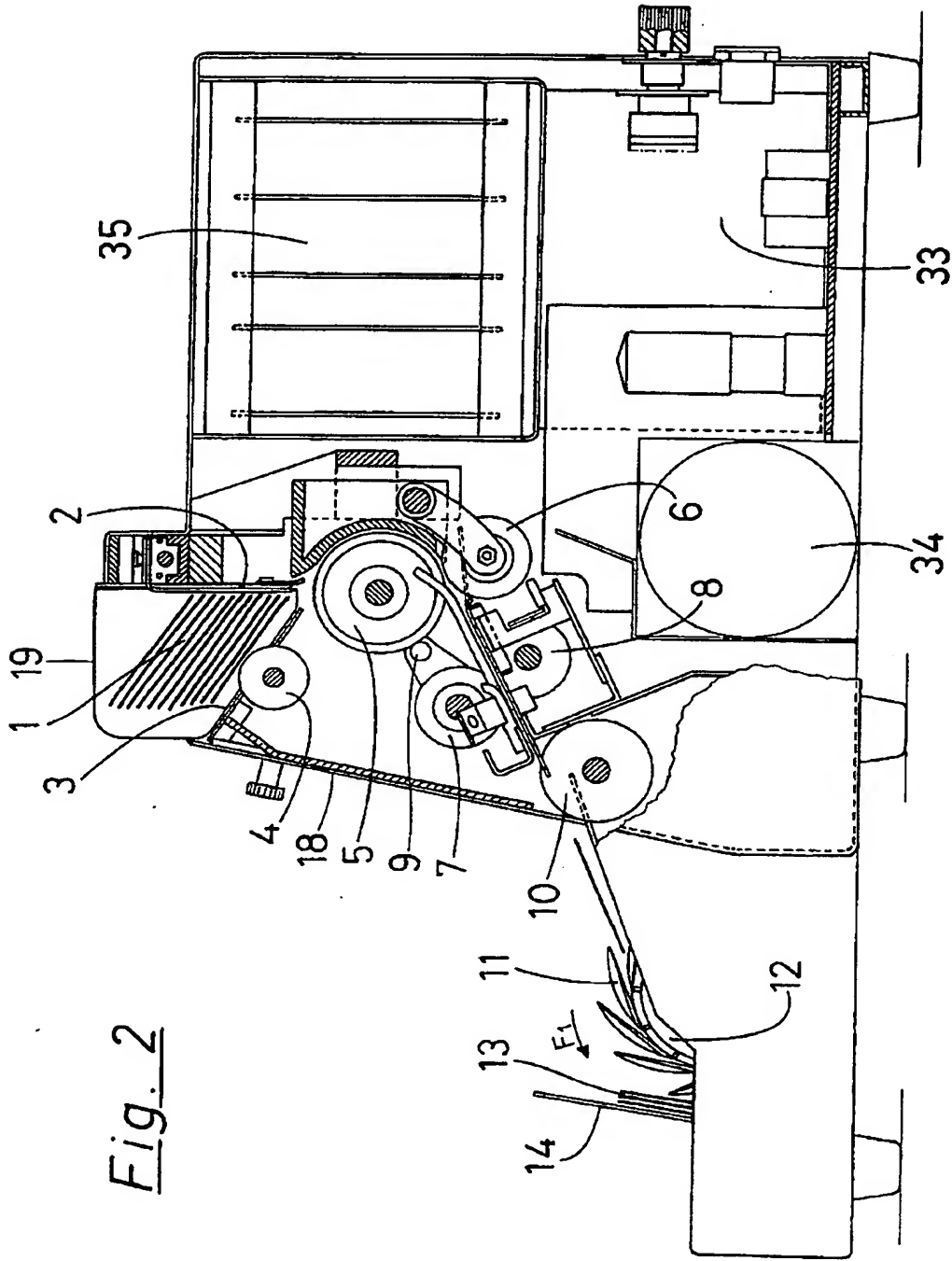
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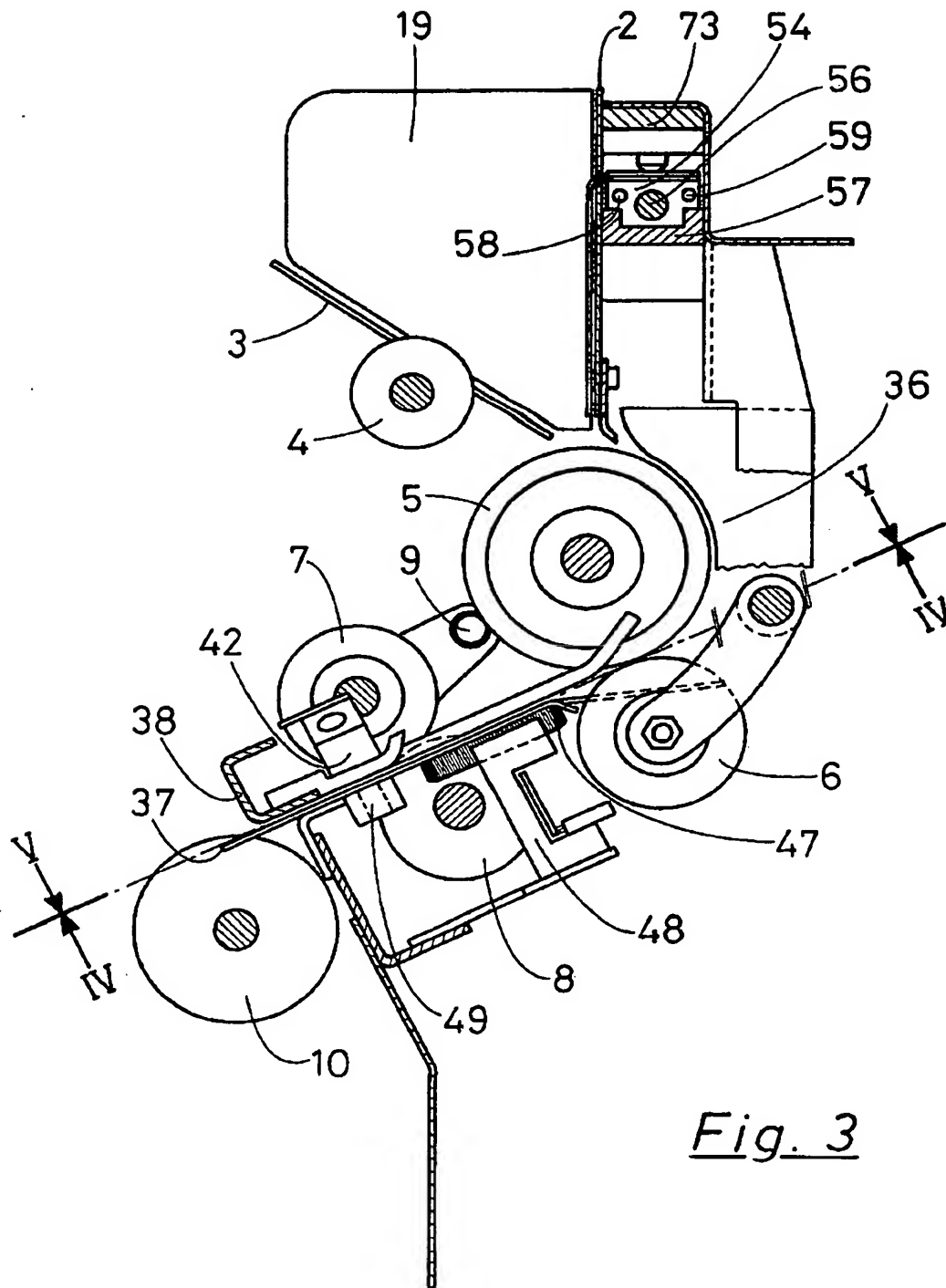


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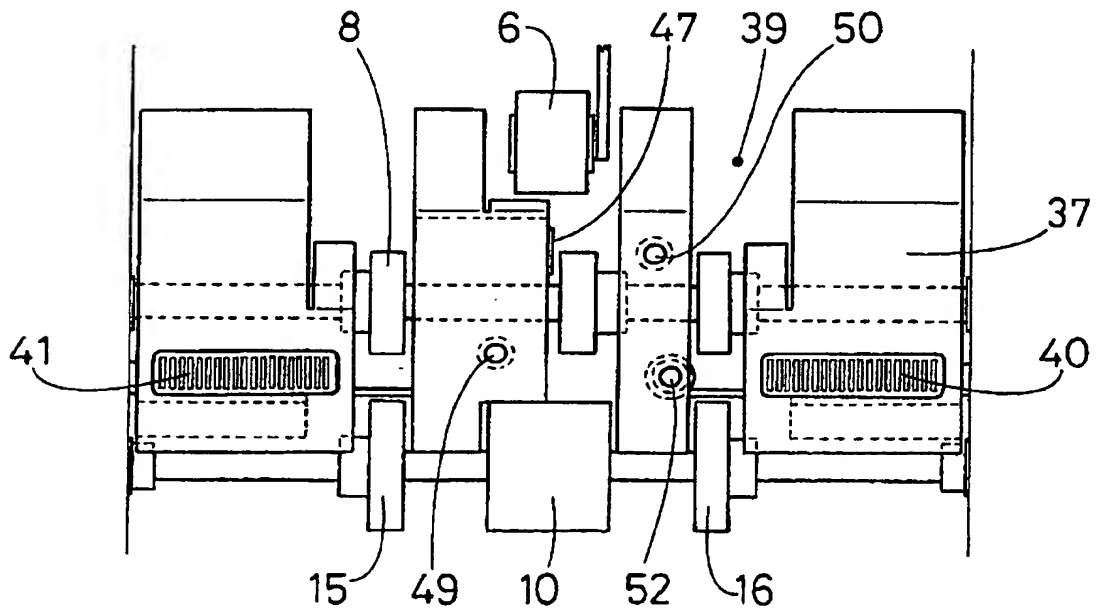
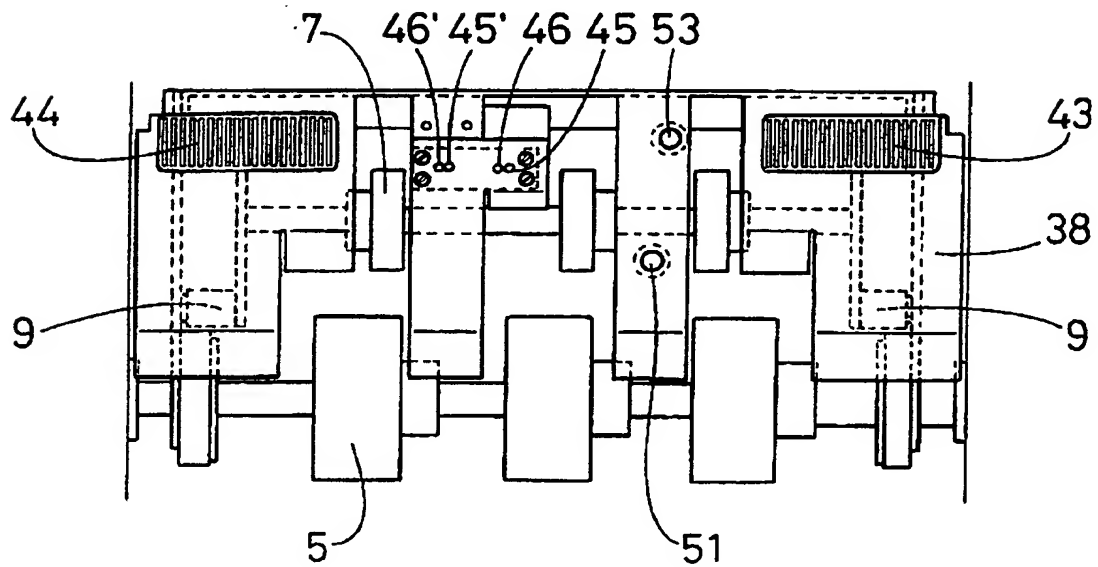
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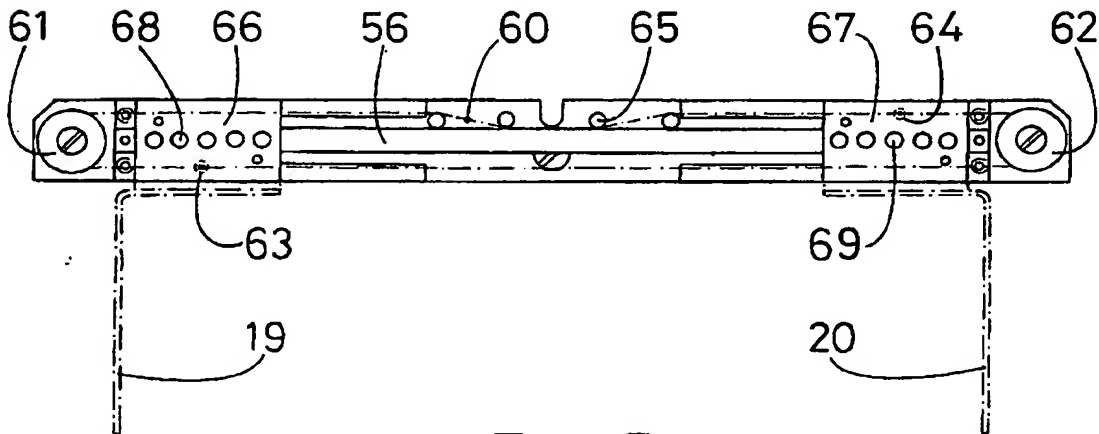
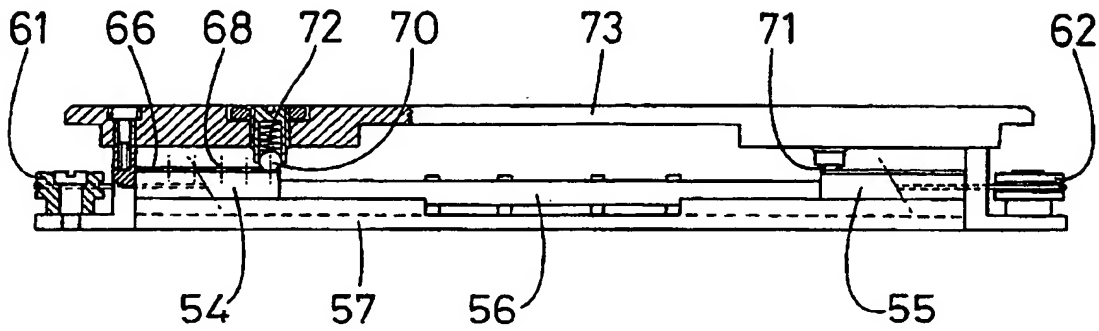
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Fig. 3

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Fig. 4Fig. 5

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Fig. 6Fig. 7

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